MJWI10 Series

10W, Wide Input Range DIP, Single & Dual Output DC/DC Converters

Key Features

- Efficiency up to 87%
- 1500VDC Isolation
- 4:1 Wide Input Range
- Temperature Performance −40°C to +60°C
- Remote On/Off Control
- Complies With EN55022 Class A

Minmax's new launched MJWI10 series comprising 16 different models. Packing up to 10W of power into a 1x1x0.4 inch package, with efficiency as high as 87%. The MJWI10 has wide input ranges of 9−36VDC and 18−75VDC and is available in output voltages of 3.3V, 5V, 5.1V, 12V, 15V, ±5V, ±12V and ±15VDC.

Other features include soft start, continuous short circuit protection, remote on/off, six−sided shielded case, and EN55022 Class A conducted noise compliance minimizes design−in time, cost and eliminate the need for external filtering.

Standard footprint targets data communication equipments, mobile battery driven equipments, distributed power systems, telecommunication equipments, mixed analog/digital subsystems, process/machine control equipments, computer peripheral systems and industrial robot systems.

Absolute Maximum Ratings

Parameter		Min.	Max.	Unit
Input Surge Voltage (1000 mS)	24VDC Input Models	−0.7	50	VDC
	48VDC Input Models	−0.7	100	VDC
Lead Temperature (1.5mm from case for 10 Sec.)		−−−	260	℃
Internal Power Dissipation		−−−	5,000	mW

Exceeding the absolute maximum ratings of the unit could cause damage. These are not continuous operating ratings.

Environmental Specifications

Parameter	Conditions	Min.	Max.	Unit
Operating Temperature	Ambient	−40	+60	℃
Operating Temperature	Case	−40	+100	℃
Storage Temperature		−40	125	℃
Humidity		−−−	95	%
Cooling	Free−Air Convection			
RFI	Six−Sided Shielded, Metal Case			
Conducted EMI	EN55022 Class A			

Model Selection Guide

Model Number	Input Voltage	Output Voltage	Output Current		Input Current		Efficiency
			Max.	Min.	@Max. Load	@No Load	@Max. Load
	VDC	VDC	mA	mA	mA (Typ.)	mA (Typ.)	% (Typ.)
MJWI10−24S033	24 (9 ~ 36)	3.3	2200	330	393	30	86
MJWI10−24S05		5	2000	300	521		84
MJWI10−24S051		5.1	2000	300	521		84
MJWI10−24S12		12	830	125	494		86
MJWI10−24S15		15	660	100	491		87
MJWI10−24D05		±5	±1000	±150	514		84
MJWI10−24D12		±12	±410	±62	488		86
MJWI10−24D15		±15	±330	±50	491		87
MJWI10−48S033	48 (18 ~ 75)	3.3	2200	330	196	20	85
MJWI10−48S05		5	2000	300	260		84
MJWI10−48S051		5.1	2000	300	260		84
MJWI10−48S12		12	830	125	247		86
MJWI10−48S15		15	660	100	246		87
MJWI10−48D05		±5	±1000	±150	257		84
MJWI10−48D12		±12	±410	±62	244		86
MJWI10−48D15		±15	±330	±50	246		87

Capacitive Load

Models by Vout	3.3V	5V	5.1V	12V	15V	±5V #	±12V #	±15V #	Unit
Maximum Capacitive Load	560	560	560	150	150	220	100	100	uF

 # For each output

Input Fuse Selection Guide

24V Input Models	48V Input Models
2000mA Slow − Blow Type	1000mA Slow − Blow Type

Input Specifications

Parameter	Model	Min.	Typ.	Max.	Unit
Start Voltage	24V Input Models	−−−	−−−	9	VDC
	48V Input Models	−−−	−−−	18	
Under Voltage Shutdown	24V Input Models	−−−	−−−	8.5	
	48V Input Models	−−−	−−−	17	
Reverse Polarity Input Current	All Models	−−−	−−−	1.5	A
Short Circuit Input Power		−−−	−−−	3000	mW
Input Filter		Pi Filter			

Output Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		---	±1.0	±2.0	%
Output Voltage Balance	Dual Output, Balanced Loads	---	±1.0	±2.0	%
Line Regulation	Vin=Min. to Max.	---	±0.3	±1.0	%
Load Regulation	Io=15% to 100%	---	±0.5	±1.2	%
Ripple & Noise (20MHz)		---	60	100	mV P-P
Ripple & Noise (20MHz)	Over Line, Load & Temp.	---	---	150	mV P-P
Over Power Protection		110	---	---	%
Transient Recovery Time	25% Load Step Change	---	300	600	uS
Transient Response Deviation		---	±3	±6	%
Temperature Coefficient		---	±0.01	±0.02	%/°C
Output Short Circuit	Continuous				

Remote On/Off Control

Parameter	Conditions	Min.	Typ.	Max.	Unit
DC/DC On	2.5 ~ 50 VDC or Open Circuit				
DC/DC off	0~1.0 VDC or Short Circuit (Pin 2 and Pin 6)				
Control Input Current (on)	Vctrl = 5V	---	---	500	uA
Control Input Current (off)	Vctrl = 0V	---	---	-500	uA
Control Common	Referenced to Negative Input				
Standby Input Current		---	---	10	mA

General Specifications

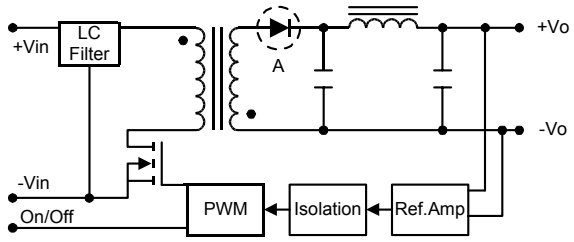
Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage Rated	60 Seconds	1500	---	---	VDC
Isolation Voltage Test	Flash Tested for 1 Second	1650	---	---	VDC
Isolation Resistance	500VDC	1000	---	---	MΩ
Isolation Capacitance	100KHz,1V	---	1000	1200	pF
Switching Frequency		---	400	---	KHz
MTBF	MIL-HDBK-217F @ 25°C, Ground Benign	350	---	---	K Hours

Notes :

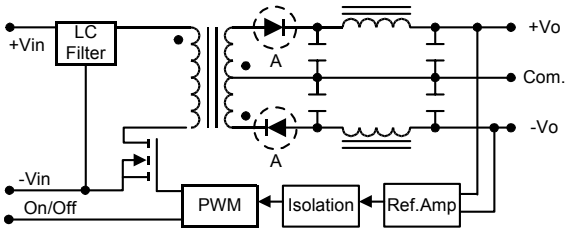
1. Specifications typical at Ta=+25°C, resistive load, nominal input voltage, rated output current unless otherwise noted.
2. Transient recovery time is measured to within 1% error band for a step change in output load of 75% to 100%.
3. Ripple & Noise measurement bandwidth is 0-20 MHz.
4. These power converters require a minimum output loading to maintain specified regulation.
5. Operation under no-load conditions will not damage these modules; however, they may not meet all specifications listed.
6. All DC/DC converters should be externally fused at the front end for protection.
7. Other input and output voltage may be available, please contact factory.
8. Specifications subject to change without notice.
9. To order the converter with heatsink, please add a suffix -HS (e.g. MJWI10-24S05/HS).

Block Diagram

Single Output

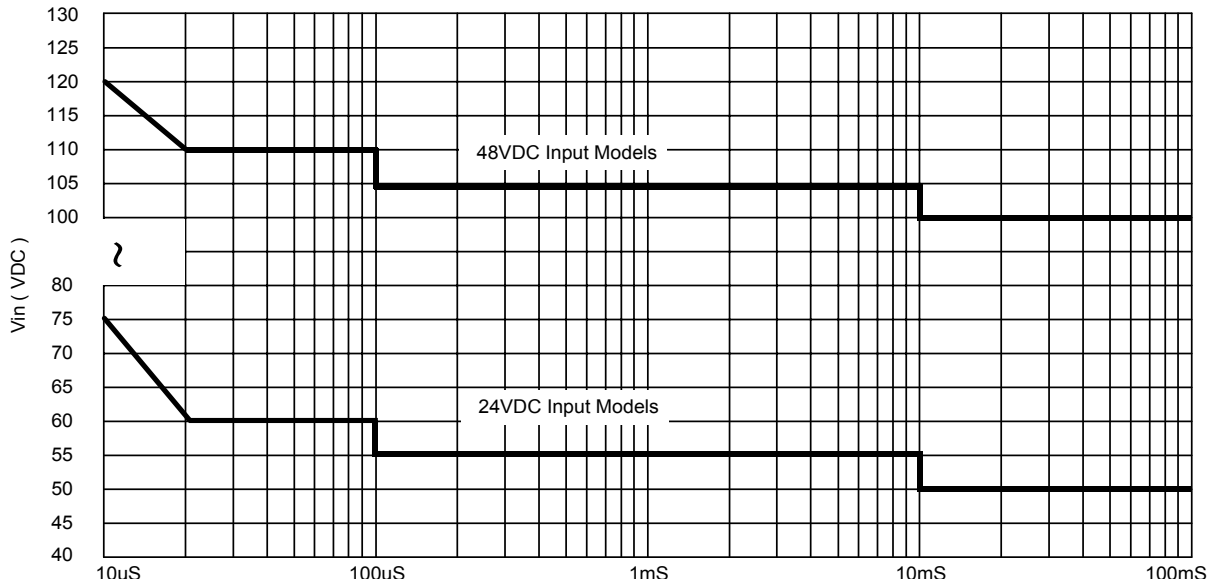


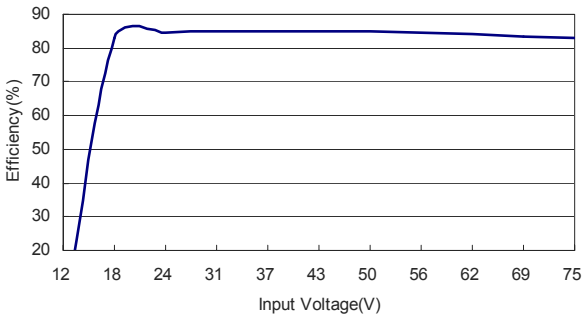
Dual Output



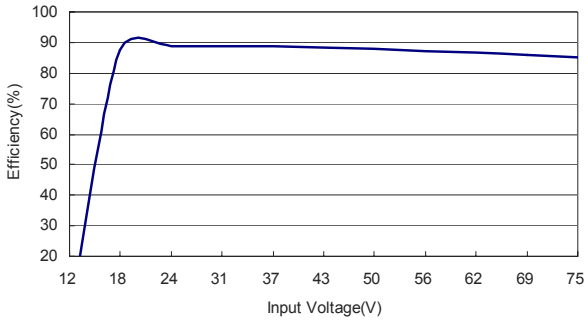
A: 3.3V −output models use the synchronous−rectifier configuration shown above.
5V, 5.1V, 12V, 15V,±5V, ±12V and ±15V−output models employ a standard, diode−rectification architecture.

Input Voltage Transient Rating

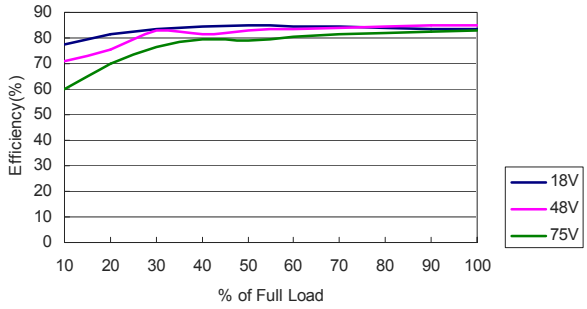




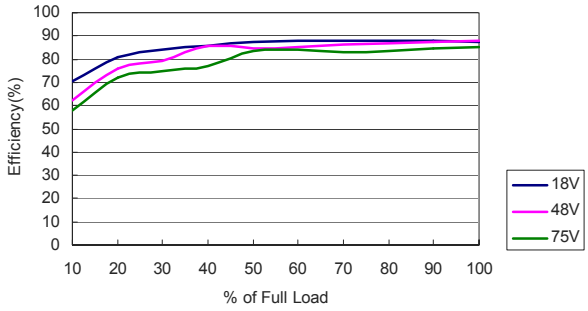
Efficiency vs Input Voltage (MJWI10-48S05)



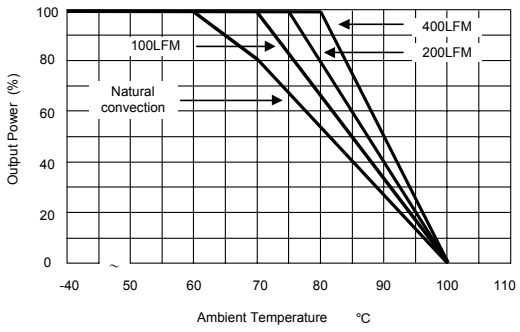
Efficiency vs Input Voltage (MJWI10-48D15)



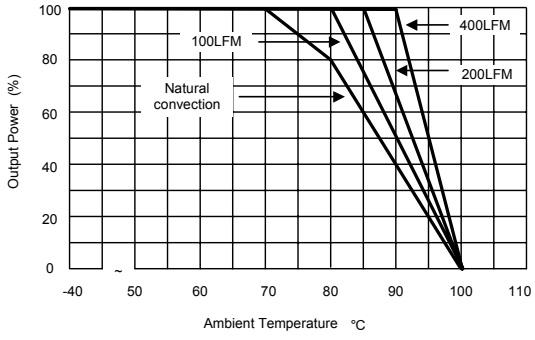
Efficiency vs Output Load (MJWI10-48S05)



Efficiency vs Output Load (MJWI10-48D15)



Derating Curve without Heatsink



Derating Curve with Heatsink

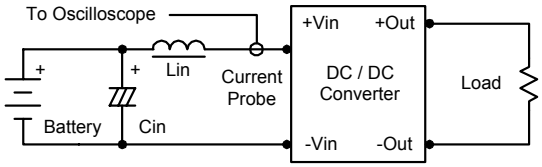
Test Configurations

Input Reflected-Ripple Current Test Setup

Input reflected−ripple current is measured with a inductor Lin (4.7uH) and Cin (220uF, ESR < 1.0Ω at 100 KHz) to simulate source impedance.

Capacitor Cin, offsets possible battery impedance .

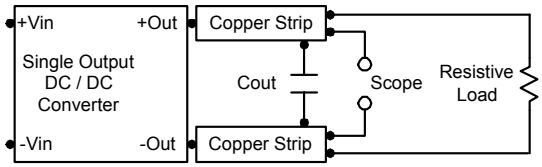
Current ripple is measured at the input terminals of the module, measurement bandwidth is 0−500 KHz.

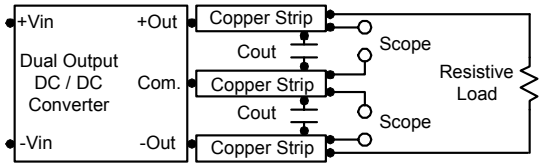


Peak-to-Peak Output Noise Measurement Test

Use a Cout 0.47uF ceramic capacitor.

Scope measurement should be made by using a BNC socket, measurement bandwidth is 0−20 MHz. Position the load between 50 mm and 75 mm from the DC/DC Converter.





Design & Feature Considerations

Remote On/Off

Positive logic remote on/off turns the module on during a logic high voltage on the remote on/off pin, and off during a logic low.

To turn the power module on and off, the user must supply a switch to control the voltage between the on/off terminal and the −Vin terminal.

The switch can be an open collector or equivalent.

A logic low is 0V to 1V.

A logic high is 2.5V to 50V.

The maximum sink current at on/off terminal during a logic low is −500uA.

The maximum allowable leakage current of the switch at on/off terminal (2.5 to 50V) is 500uA.

Overcurrent Protection

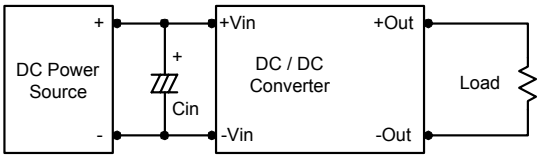
To provide protection in a fault (output overload) condition, the unit is equipped with internal current limiting circuitry and can endure current limiting for an unlimited duration. At the point of current−limit inception, the unit shifts from voltage control to current control. The unit operates normally once the output current is brought back into its specified range.

Input Source Impedance

The power module should be connected to a low ac−impedance input source. Highly inductive source impedances can affect the stability of the power module.

In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor at the input to ensure startup.

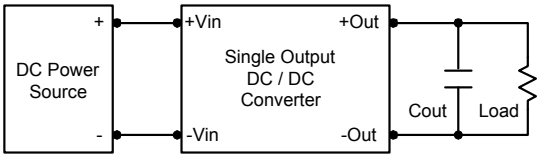
Capacitor mounted close to the power module helps ensure stability of the unit, it is recommended to use a good quality low Equivalent Series Resistance (ESR < 1.0Ω at 100 KHz) capacitor of a 6.8uF for the 24V and 48V devices

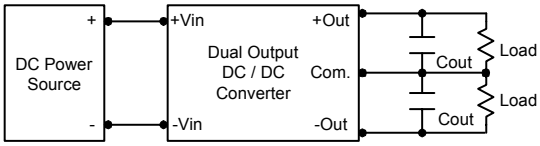


Output Ripple Reduction

A good quality low ESR capacitor placed as close as practicable across the load will give the best ripple and noise performance.

To reduce output ripple, it is recommended to use 4.7uF capacitors at the output.





Maximum Capacitive Load

The MJWI10 series has limitation of maximum connected capacitance at the output.

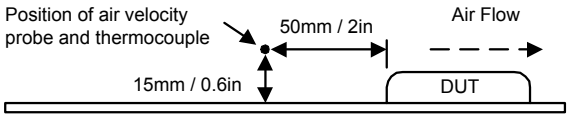
The power module may be operated in current limiting mode during start−up, affecting the ramp−up and the startup time.

The maximum capacitance can be found in the data sheet.

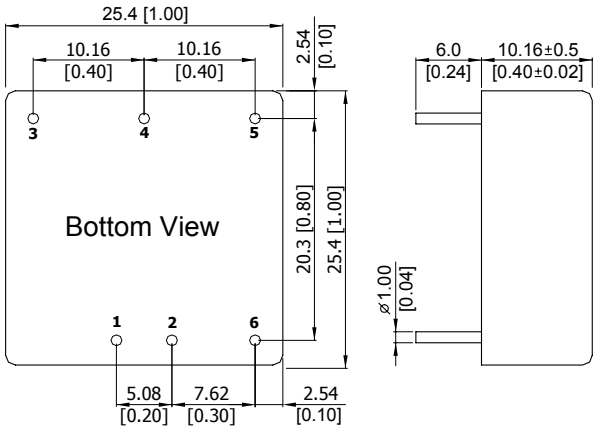
Thermal Considerations

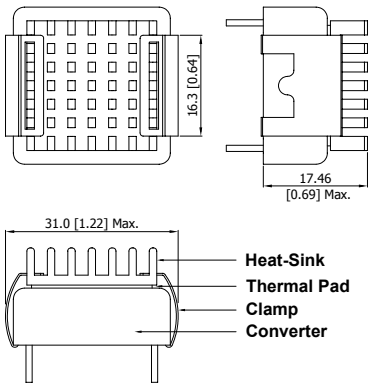
Many conditions affect the thermal performance of the power module, such as orientation, airflow over the module and board spacing. To avoid exceeding the maximum temperature rating of the components inside the power module, the case temperature must be kept below 100° C.

The derating curves are determined from measurements obtained in an experimental apparatus.



Mechanical Dimensions





Tolerance	Millimeters	Inches
	X.X±0.25	X.XX±0.01
	X.XX±0.13	X.XXX±0.005
Pin	±0.05	±0.002

Pin Connections

Pin	Single Output	Dual Output
1	+Vin	+Vin
2	−Vin	−Vin
3	+Vout	+Vout
4	No Pin	Common
5	−Vout	−Vout
6	Remote On/Off	Remote On/Off

Physical Characteristics

Case Size	:	25.4×25.4×10.16mm 1.0×1.0×0.4 inches
Case Material	:	Metal With Non−Conductive Baseplate
Weight	:	15g

Heatsink Material	:	Aluminum
Finish	:	Anodic treatment (black)
Weight	:	2.9g

***The advantages of adding a heatsink are:**

1. To help heat dissipation and increase the stability and reliability of DC/DC converters at high operating temperature atmosphere.
2. To upgrade the operating temperature of DC/DC converters, please refer to Derating Curve.